

Guide to Grassland Curing Observations for National Weather Grassland Fire Danger Forecast Indices(GFDI)



Please report each Monday and anytime you feel the grassland curing conditions have changed. Do not take into account any snow cover, as that may change rapidly and is not a factor in our calculations. Please email observations to drew.albert@noaa.gov, gerald.claycomb@noaa.gov, and mike.sutton@noaa.gov.



The Grassland Curing Guide

This guide has been prepared to assist field observers in estimating the level of grassland curing. The observations will be used as an input to aid weather forecasters to calculate a Grassland Fire Danger Index (GFDI).

The guide may be used to help identify grassland fuel moisture conditions useful in assisting fire prevention and suppression activities as well as prescribed fire operations. Estimates of curing status can aid the:

- Assessment of the onset of a fire season relative to previous years.
- Implementation of fire restrictions.
- Input into decision making for fuel reduction burning prescribed burning.
- Estimation of grassland fire danger.

The Curing Process

Most crop and pasture plant species possess a life cycle in which the plant annually dies or becomes dormant, losing its live fuel moisture and drying out. This annual process is termed curing.

During spring, pasture and prairie species undergo a period of growth and would normally complete this growth period in the late spring and early summer. This growth period varies depending on the plant type, and seasonal weather variables such as rainfall and temperature. As the period of growth is completed, crops, pastures, and grassland prairies lose their ability to draw moisture from the soil and consequently begin to cure.

A chart of the percentage of overall growth during the growing season in the central plains of the United States is shown in Figure 1. For example, the total growth of any plant during a growing season is 100%. Broken down by month, the greatest percentage of growth for tallgrass type vegetation usually occurs in June (33%), while the greatest growth for shortgrass occurs during June through July (35%). Growth slows markedly by late summer.

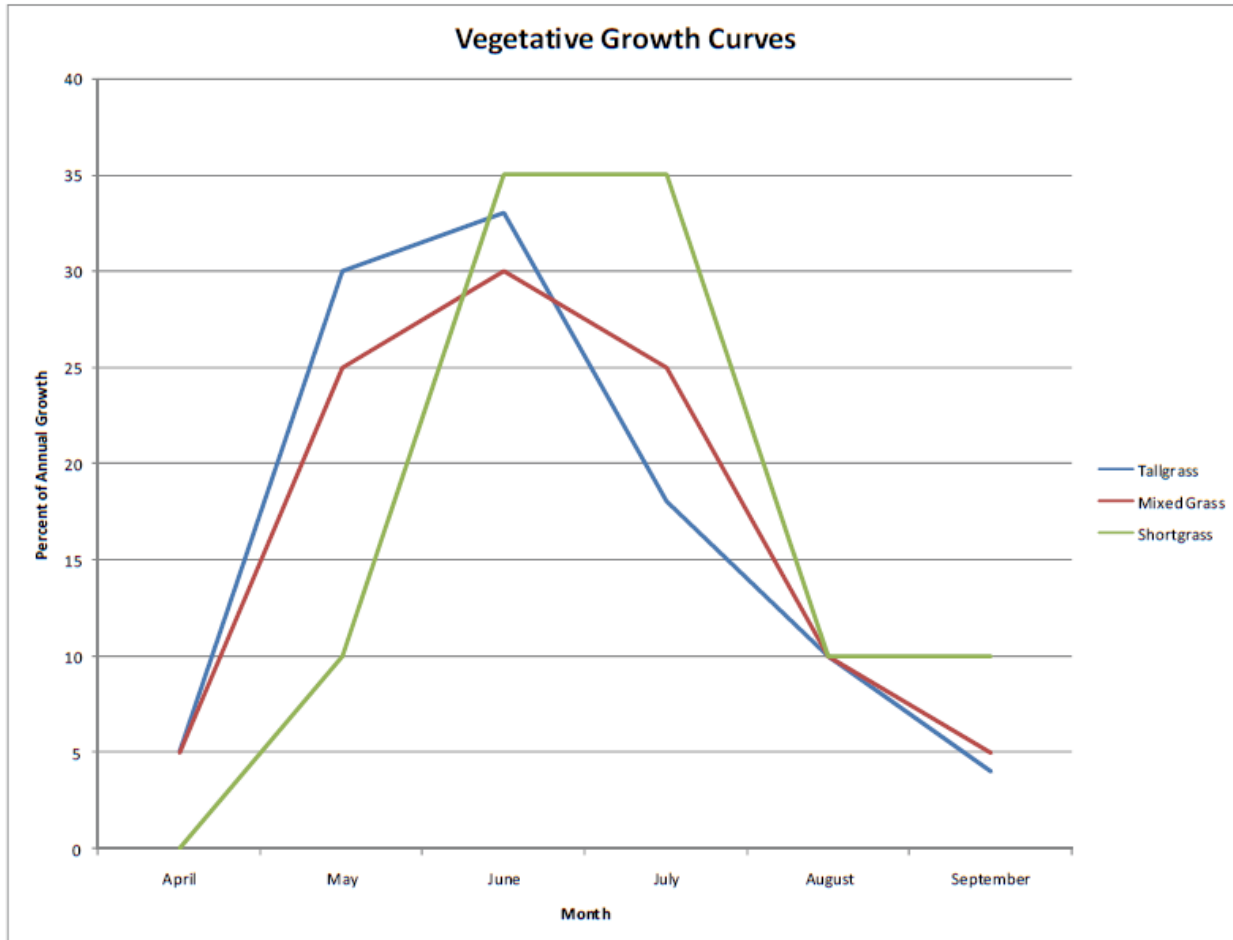


Figure 1: Basic Vegetative Growth Curves for Grasses in the U.S. Central Plains.

The Grassland Fire Danger Index (GFDI)

The Grassland Fire Index was developed for the grasslands in Eastern Australia. Curing observations along with forecast temperature, relative humidity, and sustained wind speed are used to calculate the Grassland Fire Index. The formula is below:

$$FDI = 10^{(0.009254 - 0.004096 \cdot (100 - C)^{1.536} + 0.01201 \cdot T + 0.2789 \cdot \sqrt{V} - 0.09577 \cdot \sqrt{RH})}$$

where C = curing (%), T = temperature (C), V = sustained wind (km/hr), and RH = relative humidity (%).

Numeric Results:

Grassland Fire Danger Adjective	Numeric Value
Low	0 to 2
Moderate	3 to 7
High	8 to 19
Very High	20 to 49
Extreme	50+

The GFDI is more sensitive to wind and vegetative state than the standard Red Flag Warning criteria ($RH \leq 25\%$, 20 Foot Wind ≥ 20 mph), and is expected to be of use as a factor in considering issuing Fire Weather Watches and Red Flag Warnings in areas where the dominant fuel type is grassland during high wind but moderate humidity situations.

How to Use This Guide

The following photos are a guide only and measurements made based on color alone are not adequate. Investigation of the physiological characteristics of the grass sward is also required (the descriptions are located beside each photo).

- It is recommended that observers study the pastures at close quarters and at a number of different sites before determination of the state of curing. Pasture viewed from the roadside or fence line may lead to inaccurate measurements.
- Determine the overall color of pasture and check for seed head development. Match these with the appropriate description in the guide and select the “percentage cured” figure.

Other Notes

- From the time seed heads are fully developed it will generally take at least six weeks for grasses to become fully cured.
- Late rains delay the maturing process until the onset of hot weather conditions, when curing will proceed rapidly. Lack of spring rains and an early commencement to the summer will cause grasslands to cure early but less rapidly.
- Rainfall before 60% cured will prolong grass life and slow curing, while rainfall after 60% cured will not further delay the curing of mature/adult grasses.
- Over a series of different pastures and prairies, the progression of curing will be patchy, especially during the 40% to 80% curing period (i.e. some areas will cure faster than others). Curing is more patchy with increasing plant species number and variable topography.
- Above 80% cured, fuel moisture content begins to be significantly influenced by environmental factors such as humidity and temperature.
- The long term rainfall and temperature patterns, and the growth habits of individual grass species also influence the progression of curing.

When and How to Report Curing Values

Please report each Monday and anytime you feel the grassland curing conditions have changed. Do not take into account any snow cover, as that may change rapidly and is not a factor in the calculations. Please email observations to drew.albert@noaa.gov, gerald.claycomb@noaa.gov, and mike.sutton@noaa.gov.

If you have any questions, please contact Drew Albert (drew.albert@noaa.gov). Thank you for your participation in this process. Your participation is critical to the accuracy and availability for the Grassland Fire Danger Index information.

This guide was adapted from a similar guide developed by NWS Wichita, KS. Special thanks to Mary-Beth Schreck and Paul Howerton (NWS Wichita), and Mike Sutton (NWS Springfield) for helping to set up this program up in the Springfield, MO area.

% Cured	Color	Physiological Change
0	Green	From the beginning of growth to commencement of seed head development
10	Green	Seed heads formed and flowering
20	Yellowish-Green	Seed heads maturing and seed dropping
30	Yellowish-Green	Most seed heads mature and seed dropping
40	Yellow-Green	Most seed heads mature and seed dropping
50-60	Straw—odd patch of green and greenish-yellow	Up to 1/2 of all stems have dropped their seed, some paddocks will be fully cured, others may be quite green
70-80	Straw—very little green showing anywhere	Most seed heads have dropped their seed, lower third of stalk may be green
90	Straw—odd green gully	Essentially all seed has dropped, odd individual stalk may be green
100	Bleached	All stalks fully cured, seed heads and stalks break easily

0% Cured



Color: Green



Seed Development: From the beginning of growth to the commencement of seed development.

10-20% Cured



Color: Yellowish-Green to Green



Seed Development: 10%:
Seed heads formed and flowering.

20%: Seed heads maturing and
opening from top.

30-40% Cured



Color: Yellow-Green.



Seed Development: Most seed heads mature and seed dropping.

50-60% Cured



Color: Straw-Odd
patch of green or
yellowish-green.



Seed Development:
Approximately 1/2 of all stems
have dropped their seed.

Note: Some fields will be fully
cured, others may be fairly
green.

70-80% Cured



Color: Straw, very little green showing anywhere, some greenness still evident in lower third of stalks. Many stalks fully cured.



Seed Development: Most seed heads have dropped their seed.

90% Cured



Color: Straw - Odd green patches in gullies, moist areas.



Seed Development:
Essentially all seed has dropped.
odd individual stalk may be green.

100% Cured



Color: Bleached



Seed Development: All stalks fully cured, seed heads and stalks starting to break easily.